EUROCALL

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Effects and users' reactions to the use of CAPT and HVPT on Japanese EFL learners' segmental perception and production

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Abstract. High Variability Phonetic Training (HVPT) is a perception-based pronunciation training which has brought about progress in both perception and production in English as a Foreign Language (EFL) classrooms. This could be due to the increased exposure to second language sound varieties presented at random, which is unique to HVPT. Progress in production, however, was usually slower than in perception. One explanation for this is that, in EFL contexts, the learners have fewer chances to find clues on how to articulate the target sounds, such as /r/, since HVPT only provides acoustic images. This study examines the effect of explicit instruction before and during HVPT training. The participants were shown a video on how to articulate the target sounds, and were asked to repeat the sounds after the stimuli during HVPT. The results showed significant increases, particularly in production. On a follow-up questionnaire, a majority of the participants expressed that they benefited from the inclusion of explicit instruction.

Keywords: HVPT, perception, production, explicit instruction.

1. Introduction

Iino and Thomson (2018) revealed that applying Thomson's (2017) cloud-based HVPT program English Accent Coach (EAC) as a Computer-Assisted Pronunciation Training (CAPT) improved perception of /l/, /r/, and /w/ sounds by Japanese EFL learners. However, meaningful increases in production were

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How to cite: Iino, A., Yabuta, Y., & Wistner, B. (2020). Effects and users' reactions to the use of CAPT and HVPT on Japanese EFL learners' segmental perception and production. In K.-M. Frederiksen, S. Larsen, L. Bradley & S. Thouësny (Eds), *CALL for widening participation: short papers from EUROCALL 2020* (pp. 107-113). Research-publishing.net. https://doi.org/10.14705/rpnet.2020.48.1173

not observed. As the study only required the participants to listen to the stimuli and to react by identifying the appropriate phonetic symbol, the extent to which instructional interventions during HVPT affect learners' production is not clear. Thus, the present study examined the effects of explicit instruction before and during HVPT. The instruction included showing the learners a video that explained how to articulate the target sounds of /l/ and /r/, and repeating the stimuli aloud during the HVPT task.

RQ 1: what are the effects of HVPT with explicit instruction on perception and production of English /l/, /r/, and /w/ over time?

RQ 2: what are the learners' reactions to the use of HVPT with explicit instruction?

2. Method

2.1. Participants

The participants were 19 first-year Japanese university students who majored in economics at a university in the Tokyo area. They were enrolled in mandatory English courses, and met every week. They agreed to participate in the HVPT sessions inside and outside the class as assignments. Their English proficiency level was in CEFR B1 based on TOEIC ITP scores (M=579, SD=79).

2.2. Treatment

A pre-test and post-test design was adopted for a ten-week treatment period during the spring semester in 2019.

In the first week, three target sounds were presented to the participants through online videos explaining how to articulate /r/ and /l/ sounds. The students then began HVPT using EAC. Every week, the participants practiced the first round of the training in class, and were assigned to do it two more times during the week. They were urged to repeat aloud right after they heard the stimuli in a syllable or a word, but before answering the forced-choice identification task through EAC. Each training session consisted of 200 stimuli. They were presented in two kinds of phonemic environments alternating week by week: Consonant + Vowel (CV) and Consonant + Vowel + Consonant (CVC).

2.3. Measurement

In the first and the tenth weeks, the participants' perception and production skills were assessed. Only perception was assessed after the fifth week to see the immediate effects on each phonemic environment. Perception was measured with 100 CV and 100 CVC items randomly consisting of the three target consonants. The sounds were also randomized with 30 talkers' stimuli. Production was measured with 27 syllables and words that were recorded using the carrier phrase method (Thomson, 2012). Three experienced English teachers judged the production samples together, discussing any discrepancies when necessary. A questionnaire was given after the training. It had seven Likert-type items and one open-ended question that asked what the participants thought about the training.

3. Results and discussion

Overall, perception improved from 77% (Time 1; T1) to 90% (Time 2; T2) and to 93% (Time 3; T3), which was statistically significant, and exhibited a moderate effect size ($F(2,18)=41.1$, $p<.01$, $\eta 2=.38$), shown in Figure 1 and Table 1). The effect originated from the progress between Times 1 and 2, as the post-hoc Bonferroni test indicated a significant difference ($t=7.0$, $p<.01$, $d=1.14$). The increase of about 16% was a little larger than the 13% observed by Iino and Thomson (2018).

Significant progress between T1 and T3 was found for each of the consonants in the overall average scores for the CV and CVC conditions: /l/ ($F(2,18)=45.7$, $p<.01$, $\eta 2=.45$), /r/ ($F(2,18)=414.7$, $p<.01$, $\eta 2=.24$), and /w/ ($F(2,18)=11.2$, $p<.01$, $\eta 2=.28$). Except for /r/ in CV, which improved from 67% (T1) to 73% (T2) and to 78% (T3), participants' perception of the target sounds showed statistically significant progress, particularly between T1 and T2.

Significant gains for production were also observed from 40% (11 points out of 27) at Time 1 to 65% (17.5 points out of 27) at Time 3 ($t(18)=5.7$, $p<.01$, $d=1.68$) (Figure 2). Gains were found for all three consonants in the two linguistic environments, except for /w/ in CV, which was produced rather accurately from the beginning (88% at Time 1). A large gain was found for /l/ in both the CV and CVC conditions (32% in CV, 48% in CVC). Although the amount of increase for /r/ was lower than for the other two consonants, a significant increase was also observed. One explanation for the differing gains could be that it was more challenging to learn the articulation of /r/ due to its difficulty (Table 2).

Figure 1. Perception progress (%)

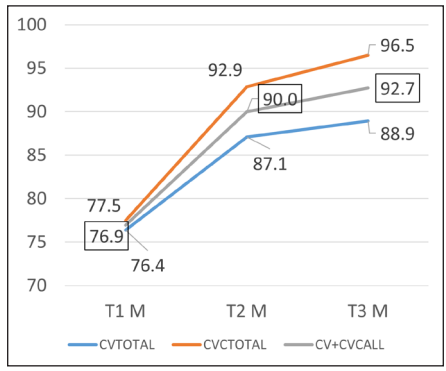


Figure 2. Production progress (%)

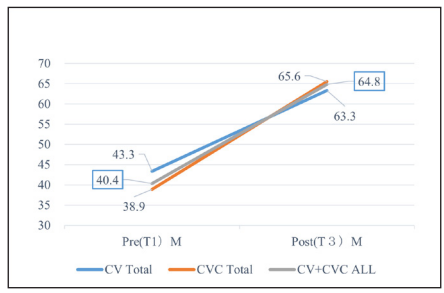


Table 1. Descriptive statistics for perception scores (*N*=19)

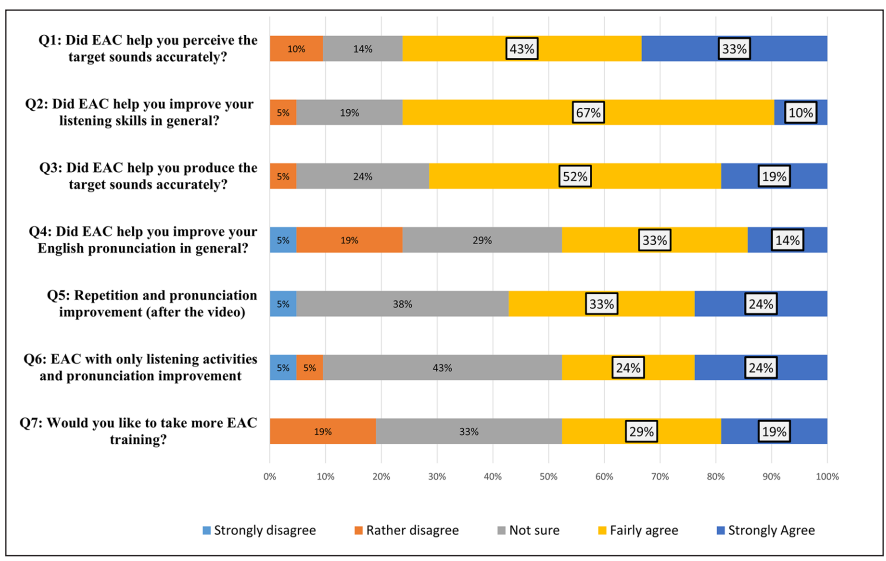
		Time 1		Time 2		Time 3	
Perception		**M**	**SD**	**M**	**SD**	**M**	**SD**
CV	L	69.4	18.3	89.3	12.5	89.6	13.2
	R	67.4	19.0	73.3	21.9	78.5	19.2
	W	92.4	10.3	98.7	2.3	98.7	2.0
	LRW	76.4	19.9	87.1	18.0	88.9	15.8
CVC	L	76.9	15.6	95.6	5.2	97.4	3.8
	R	62.2	21.1	84.1	14.4	92.7	10.5
	W	94.3	6.0	99.0	1.3	99.5	1.1
	LRW	77.5	20.4	92.9	10.9	96.5	7.1
CV+CVC	L	73.2	17.4	92.4	10.1	93.5	10.4
	R	64.8	64.8	78.7	19.3	85.6	17.0
	W	93.3	8.6	98.8	1.9	99.1	1.7
	LRW	76.9	20.2	90.0	15.2	92.7	12.8

Table 2. Descriptive statistics and statistical analyses for production scores (*N*=19)

			Time 1			Time 3			T3-T1				
		No. of items	M	SD	%	M	SD	%	M	SD	%	p value	Cohen's d
CV	L	3	0.63	0.83	21%	1.58	1.2	53%	0.95	1.22	32%	**	1.14
	R	3	0.68	0.82	23%	1.42	1.1	47%	0.74	1.05	25%	**	0.90
	W	3	2.63	0.60	88%	2.68	0.6	89%	0.05	0.52	2%		0.09
	SUM	9	3.95	1.51	44%	5.68	2.1	63%	1.74	2.00	19%	**	1.15
CVC	L	6	1.20	1.42	20%	4.05	1.8	68%	2.89	2.00	48%	**	2.04
	R	6	0.70	1.10	12%	1.74	1.6	29%	1.00	1.33	17%	**	0.91
	W	6	4.90	1.13	82%	5.68	0.5	95%	0.74	1.33	12%	*	0.65
	SUM	18	7.00	2.87	39%	11.79	3.3	66%	4.79	3.52	27%	**	1.67
CV+ CVC	L	9	1.80	2.10	20%	5.63	2.7	63%	3.84	2.85	43%	**	1.83
	R	9	1.40	1.77	16%	3.16	2.5	35%	1.74	2.13	19%	**	0.98
	W	9	7.60	1.35	84%	8.37	0.8	93%	0.79	1.51	9%	*	0.58
	SUM	27	10.9	3.88	40%	17.47	5.1	65%	6.53	4.98	24%	**	1.68

*p<0.05. **p<0.01

Figure 3. Results of the questionnaire on the use of EAC (*N*=19)



Regarding the participants' reaction to the use of HVPT using EAC, they felt improvement both in perception and overall listening ability, as 76% of them agreed with Q1, and 77% with Q2 (Figure 3). In terms of production, while 71% reported

that the training helped them to improve their production of the target sounds (Q3), only 47% agreed that their overall pronunciation improved (Q4). The comparative difference felt by adding the explicit instruction was 10%; the agreement ratio to Q5 was 57%, but it was 48% for Q6. Overall, the participants indicated a sense of effectiveness for perception, and around half of them thought the training was effective for production.

Concerning the open-ended question, 17 out of the 19 participants wrote positive comments, such as "I found it interesting to learn there were varieties, even for the same consonants. I want to do this kind of task for other consonants and vowels", and "I began to pay attention to my pronunciation more than before". The participants seemed to have experienced the benefits of HVPT, listening to the variation in speakers' production of phonemes, and acquiring production skills based on perception skills.

4. Conclusions

This study found positive effects of HVPT with explicit instruction on perception and production. In particular, the effects on production were significantly larger than those found in the perception-only condition (Iino & Thomson, 2018). Participants' reactions to the use of HVPT also indicated a sense of effectiveness for perception, as well as production. Overall, HVPT in CAPT, or EAC use in class, showed its educational potential for EFL learners, particularly with the addition of explicit instruction. Further classroom research is needed to clarify the degree of explicitness in computer-mediated instruction that promotes L2 learning.

5. Acknowledgments

This work was supported by JSPS KAKEN Grant No. 20K00785 (Leader: Iino).

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Published by Research-publishing.net, a not-for-profit association
Contact: info@research-publishing.net

CALL for widening participation: short papers from EUROCALL 2020
Edited by Karen-Margrete Frederiksen, Sanne Larsen, Linda Bradley, and Sylvie Thouësny

Publication date: 2020/12/14

Typeset by Research-publishing.net
Cover theme by © 2020 Marie Flensborg (frw831@hum.ku.dk), based on illustration from freepik.com
Cover layout by © 2020 Raphaël Savina (raphael@savina.net)

ISBN13: 978-2-490057-81-8 (Ebook, PDF, colour)

British Library Cataloguing-in-Publication Data.
A cataloguing record for this book is available from the British Library.

Legal deposit, France: Bibliothèque Nationale de France - Dépôt légal: décembre 2020.